CLAIMS:

1. A process for the patterning of a desired substance on a surface comprising:

(i) charging a particle formation vessel, the temperature and pressure in which are controlled, with a compressed fluid;

(ii) introducing into the particle formation vessel at least a first feed stream comprising at least a solvent and the desired substance dissolved therein through a first feed stream introduction port and a second feed stream comprising the compressed fluid through a second feed stream introduction port, wherein the desired substance is less soluble in the compressed fluid relative to its solubility in the solvent and the solvent is soluble in the compressed fluid, and wherein the first feed stream is dispersed in the compressed fluid, allowing extraction of the solvent into the compressed fluid and precipitation of particles of the desired substance,

(iii) exhausting compressed fluid, solvent and the desired substance from the particle formation vessel at a rate substantially equal to a rate of addition of such components to the vessel in step (ii) while maintaining temperature and pressure in the vessel at a desired constant level, such that formation of particulate material in the vessel occurs under essentially steady-state conditions, wherein the compressed fluid, solvent and the desired substance are exhausted through a restrictive passage to a lower pressure whereby the compressed fluid is transformed to a gaseous state, and wherein the restrictive passage includes a discharge device that produces a shaped beam of particles of the desired substance at a point beyond an outlet of the discharge device, where the fluid is in a gaseous state at a location before or beyond the outlet of the discharge device; and

(iv) exposing a receiver surface to the shaped beam of particles of the desired substance and selectively depositing a pattern of particles on the receiver surface.

2. A process according to claim 1, wherein the compressed fluid comprises a supercritical fluid.

3. A process according to claim 1, wherein the restrictive passage includes a partial-expansion chamber before the discharge device, in which the pressure of the compressed fluid, solvent and the desired substance exhausted from the particle formation vessel is decreased prior to passage through the discharge device.

4. A process according to claim 3, wherein the partial-expansion chamber is maintained at a temperature and pressure sufficient to maintain the solvent in a non-condensed state.

5. A process according to claim 3, wherein precipitated particles of the desired substance are subjected to an electrical, magnetic, or sonic force, or any combination of such forces, in the partial-expansion chamber.

6. A process according to claim 1, wherein particles of the desired substance are precipitating in the particle formation vessel with a volume-weighted average diameter of less than 100 nanometers.

7. A process according to claim 6, wherein the coefficient of variation of the particle size distribution of the particles of the desired substance precipitated in the particle formation vessel is less than 50%.

8. A process according to claim 6, wherein the coefficient of variation of the particle size distribution of the particles of the desired substance precipitated in the particle formation vessel is less than 20%.

9. A process according to claim 1, wherein particles of the desired substance are precipitating in the particle formation vessel with a volume-weighted average diameter of less than 50 nanometers.

10. A process according to claim 1, wherein particles of the desired substance are precipitating in the particle formation vessel with a volume-weighted average diameter of less than 10 nanometers.

11. A process according to claim 1, wherein the discharge device produces a shaped beam in which the majority of particles of the desired substance are contained within a diverging cone having a cone angle of at most 90 degrees at a point beyond an outlet of the discharge device.

12. A process according to claim 1, wherein the discharge device produces a shaped beam in which the majority of particles of the desired substance are contained within a diverging cone having a cone angle of at most 45 degrees at a point beyond an outlet of the discharge device.

13. A process according to claim 1, wherein the discharge device produces a substantially collimated or focused beam of particles of the desired substance at a point beyond an outlet of the discharge device.

14. A process according to claim 1, wherein contents of the particle formation vessel are agitated with a rotary agitator comprising an impeller having an impeller surface and an impeller diameter, creating a relatively highly agitated zone located within a distance of one impeller diameter from the surface of the impeller of the rotary agitator, and a bulk mixing zone located at distances greater than one impeller diameter from the surface of the impeller, and wherein the first and second feed stream introduction ports are located within a distance of one impeller diameter from the surface of the impeller of the rotary agitator such that the first and second feed streams are introduced into the highly agitated zone of the particle formation vessel and the first feed stream is dispersed in the compressed fluid by action of the rotary agitator.

15. A process according to claim 1, wherein the discharge device comprises a nozzle with an outlet opening of less than 5 microns.

16. A process according to claim 1, wherein the discharge device comprises a nozzle with an outlet opening of less than 1 micron.

17. A process according to claim 1, where the desired substance deposited in step (iv) comprises a colorant in a polymeric binder.

18. A process according to claim 16, wherein the colorant comprises a dye.

19. A process according to claim 1, comprising a continuous ink jet printing process wherein the compressed fluid, solvent and the desired substance are exhausted through the restrictive passage at a known constant flow rate and input of materials to the particle formation vessel are controlled based on the known constant flow rate.

20. A process according to claim 1, comprising a drop on demand ink jet printing process wherein the compressed fluid, solvent and the desired substance are exhausted through the restrictive passage in a varying output flow rate and input of materials to the particle formation vessel are controlled to match the varying output flow rate.